

- 20 -

CLAIMS

What is claimed is:

- 5 1. A multichannel deep brain stimulation system (10) comprising:
 an implantable pulse generator (20) connected to at least one electrode array (30), said at least one electrode array having a plurality of electrodes (32) through which electrical stimuli may be applied to body tissue;
 a rechargeable battery (27) coupled to the implantable pulse generator;
10 a hand-held programmer (50); and
 an external battery charging system (40);
 wherein the implantable pulse generator (20) and at least one electrode array (30) are adapted to be implanted directly in the cranium of a patient, whereby electrical stimuli may be applied to brain tissue of the patient; and
15 wherein the implantable pulse generator (20) includes control circuits (21, 26, 27) and memory circuits (22, 24) that cause stimulation pulses to be applied through at least one of a plurality of channels to the electrodes (32) of the at least one electrode array in accordance with a program stored within the memory circuits of the implantable pulse generator; and
20 wherein the hand-held programmer (50) may be coupled to the implantable pulse generator through an RF link (44) for the purpose of programming and testing the implantable pulse generator (20); and
 wherein the external battery charging system (40) may be inductively coupled to the rechargeable battery (27) for the purpose of replenishing the power
25 stored within the rechargeable battery.

2. The deep brain stimulation system of Claim 1 further including a manufacturing and diagnostic system (70), the manufacturing and diagnostic system including means for coupling with the implantable pulse generator (20) through an RF link (45).

3. The deep brain stimulation system of Claim 2 wherein the manufacturing and diagnostic system (70) further includes means for coupling with the hand-held programmer (50) through an infra-red link (47).

- 21 -

4. The deep brain stimulation system of Claim 1 wherein at least two electrode arrays (30, 30') are attached to the implantable pulse generator (20), thereby facilitating bilateral stimulation of the brain of the patient.

5 5. The deep brain stimulation system of Claim 5 wherein each of the electrode arrays (30 and 30') includes at least two and as many as sixteen electrodes (32, 32').

6. The deep brain stimulation system of Claim 1 further including a clinician 10 programmer (60), and wherein the clinician programmer (60) may be coupled to the hand-held programmer (50) through an infra-red link (46) for the purpose of coupling the clinician programmer with the implantable pulse generator (20).

7. The deep brain stimulation system of Claim 1 wherein the at least one 15 electrode array (30) is detachably connected to the implantable pulse generator (20) through a header connector (22).

8. The deep brain stimulation system of Claim 7 wherein the at least one electrode array (30) is capacitively coupled to an output circuit (25) of the implantable 20 pulse generator.

9. A multichannel bilateral deep brain stimulation system (10) comprising: an implantable pulse generator (20) detachably connected to a plurality of electrode arrays (30, 30'), each of said plurality of electrode arrays having a plurality of 25 electrodes (32) thereon through which electrical stimuli may be applied to body tissue; processing means (21, 26, 27) and memory circuits (22, 24) included within the implantable pulse generator that cause stimulation pulses to be applied to selected electrodes (32) of the plurality of electrode arrays in accordance with a stimulation program stored within the memory circuits;

30 a rechargeable battery (27) included within the implantable pulse generator that provides operating power for the implantable pulse generator; means (50) for non-invasively programming the memory circuits with a desired stimulation program; and means (40) for non-invasively recharging the rechargeable battery.